



NOAA's Role & Opportunities for Collaboration in Landscape Conservation Cooperatives (LCCs)

**NOAA NWS
Climate Services Meeting
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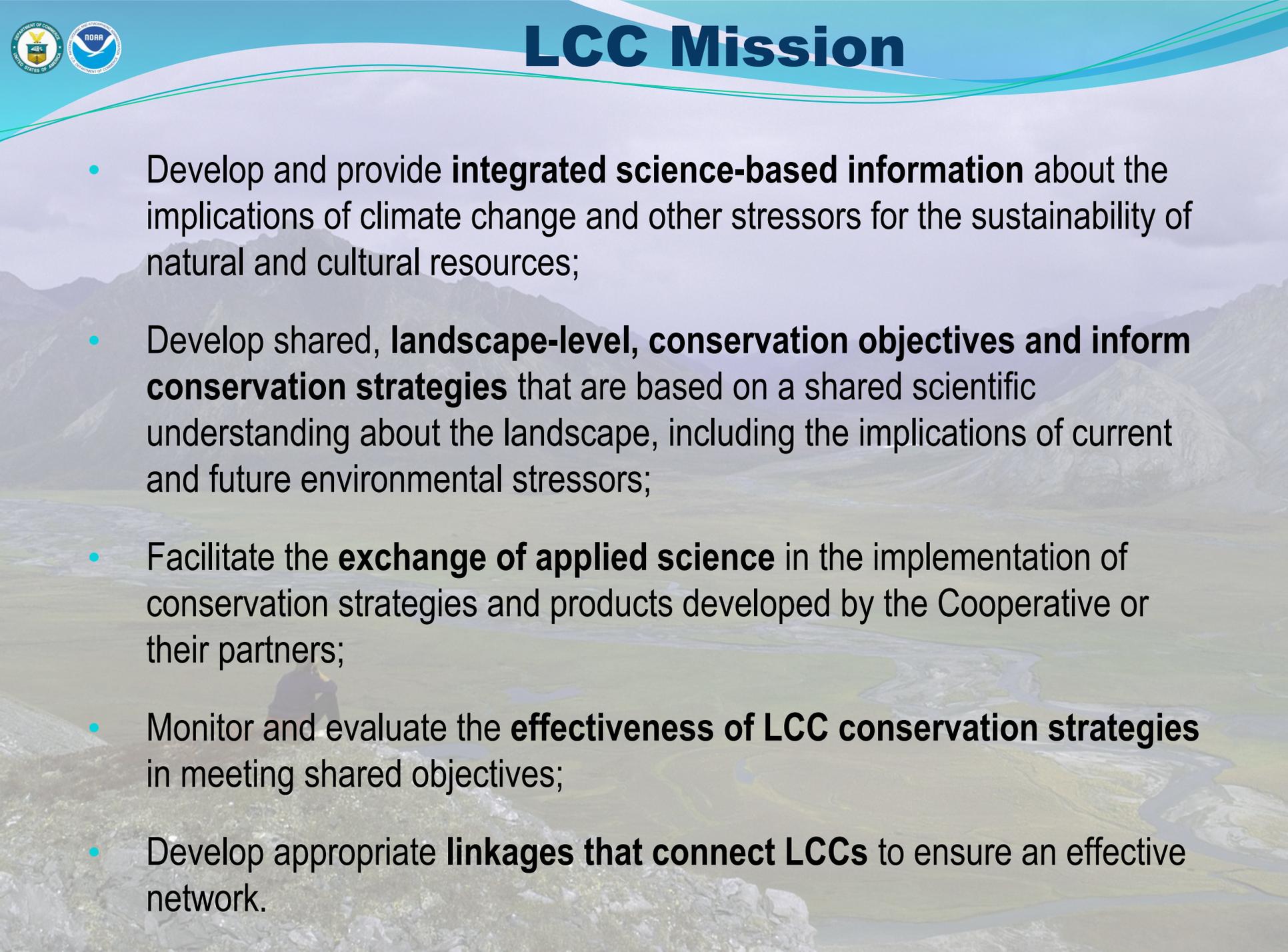




- **LCCs Overview**
- **NOAA's Engagement with LCCs**
- **Landscape to Seascape Collaboration: building upon success**
- **Opportunities & Challenges**
- **Resources**

*Landscapes and seascapes
capable of sustaining natural
and cultural resources for current
and future generations*





LCC Mission

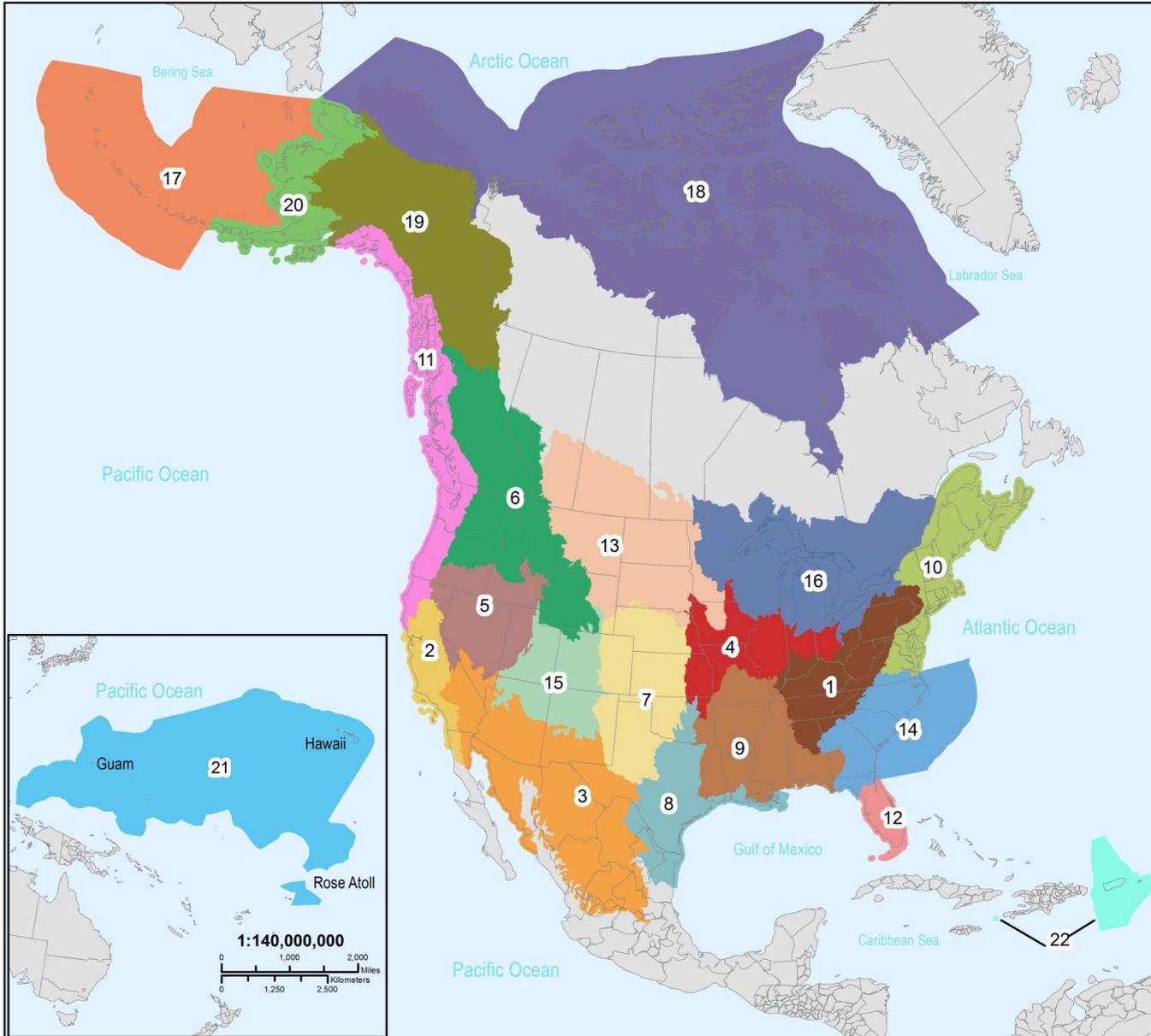
- Develop and provide **integrated science-based information** about the implications of climate change and other stressors for the sustainability of natural and cultural resources;
- Develop shared, **landscape-level, conservation objectives and inform conservation strategies** that are based on a shared scientific understanding about the landscape, including the implications of current and future environmental stressors;
- Facilitate the **exchange of applied science** in the implementation of conservation strategies and products developed by the Cooperative or their partners;
- Monitor and evaluate the **effectiveness of LCC conservation strategies** in meeting shared objectives;
- Develop appropriate **linkages that connect LCCs** to ensure an effective network.



Landscape Conservation Cooperatives (LCC) Network Map

Landscapes capable of sustaining natural and cultural resources for current and future generations.

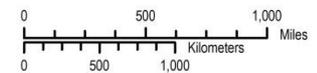
LANDSCAPE CONSERVATION COOPERATIVES



LCC Names

- 1. Appalachian
- 2. California
- 3. Desert
- 4. Eastern Tallgrass Prairie and Big Rivers
- 5. Great Basin
- 6. Great Northern
- 7. Great Plains
- 8. Gulf Coast Prairie
- 9. Gulf Coastal Plains and Ozarks
- 10. North Atlantic
- 11. North Pacific
- 12. Peninsular Florida
- 13. Plains and Prairie Potholes
- 14. South Atlantic
- 15. Southern Rockies
- 16. Upper Midwest and Great Lakes
- 17. Aleutian and Bering Sea Islands
- 18. Arctic
- 19. Northwest Boreal
- 20. Western Alaska
- 21. Pacific Islands
- 22. Caribbean

Scale 1:45,000,000



Map prepared by USFWS August 2015
Datum: WGS 84
Projection: Albers Equal Area Conic
Map Inset Projection: Equidistant Conic - Central Meridian 180 degrees
The USFWS makes no warranty for use of this map and cannot be held liable for actions or decisions based on map content.



22 Self-directed LCCs

- Steering Committee
- Staff
- Technical Committees



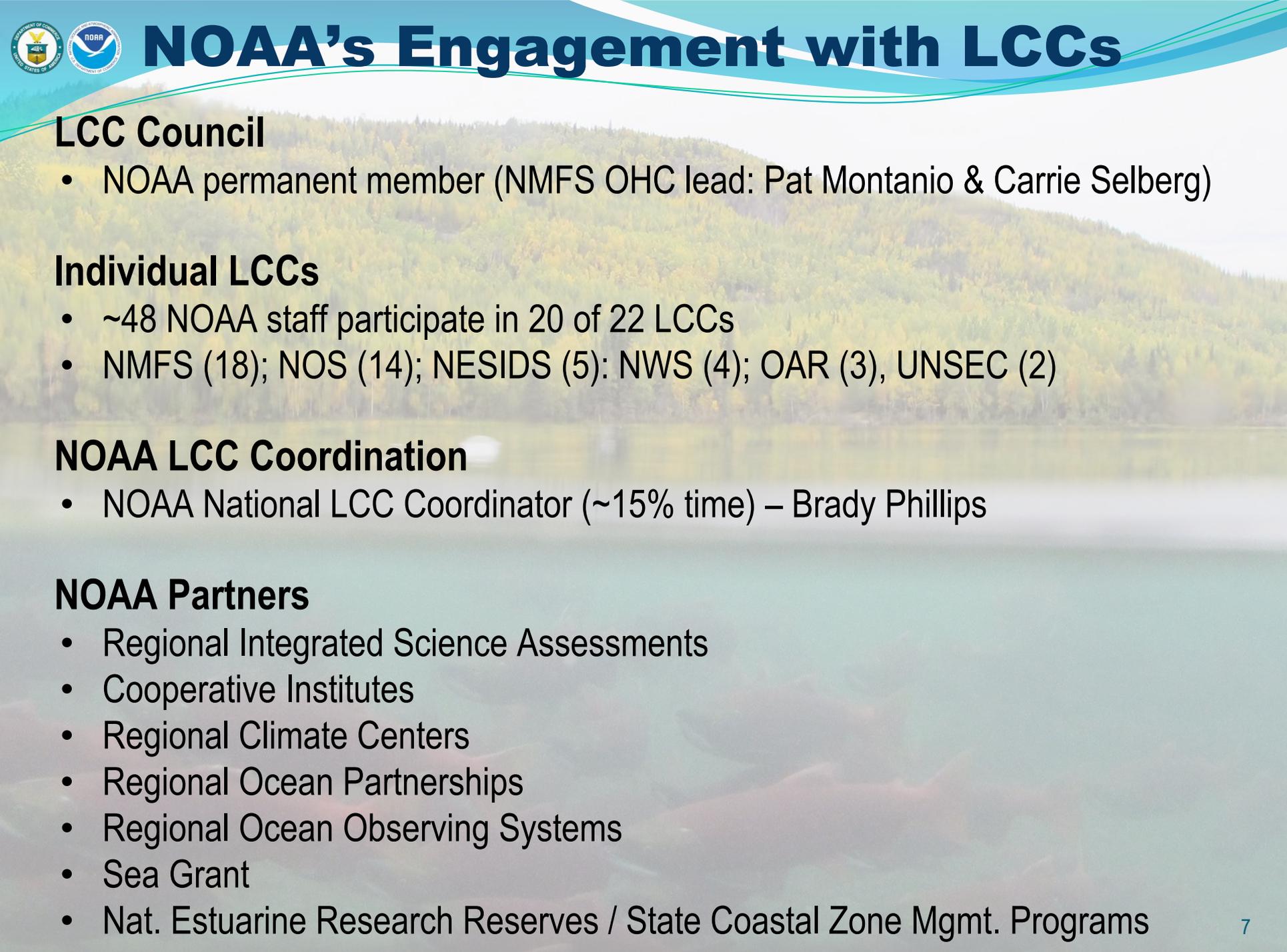
LCC Network Operations (FWS)

- National Staff
- LCC Coordinators Team
- Science Coordinators Team
- Executive Committee
- Work Groups



LCC Council

- Coordination & Strategic Guidance
- Federal; State; Tribal; NGO; LCCs; Major Partnerships; International



NOAA's Engagement with LCCs

LCC Council

- NOAA permanent member (NMFS OHC lead: Pat Montanio & Carrie Selberg)

Individual LCCs

- ~48 NOAA staff participate in 20 of 22 LCCs
- NMFS (18); NOS (14); NESIDS (5); NWS (4); OAR (3), UNSEC (2)

NOAA LCC Coordination

- NOAA National LCC Coordinator (~15% time) – Brady Phillips

NOAA Partners

- Regional Integrated Science Assessments
- Cooperative Institutes
- Regional Climate Centers
- Regional Ocean Partnerships
- Regional Ocean Observing Systems
- Sea Grant
- Nat. Estuarine Research Reserves / State Coastal Zone Mgmt. Programs

Building Upon Success in Alaska

Changes in Coastal Storms and their Impacts

Partners

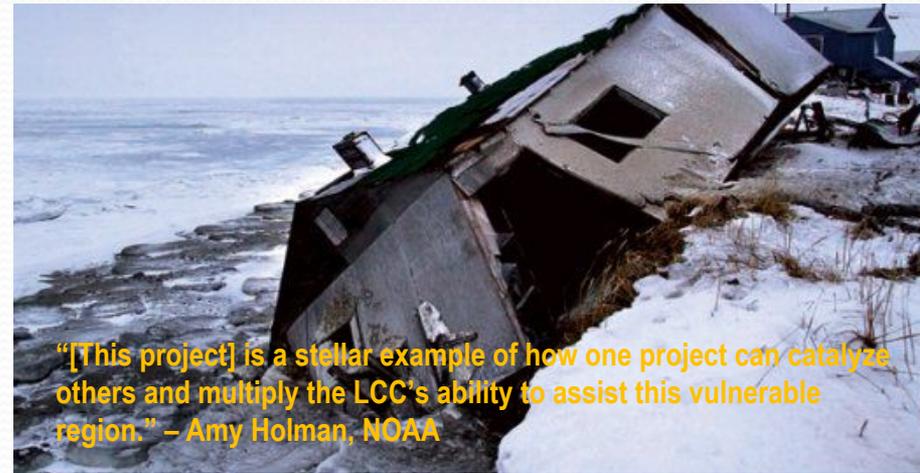
- Western AK LCC, CSC, NOAA, Notre Dame

Issues

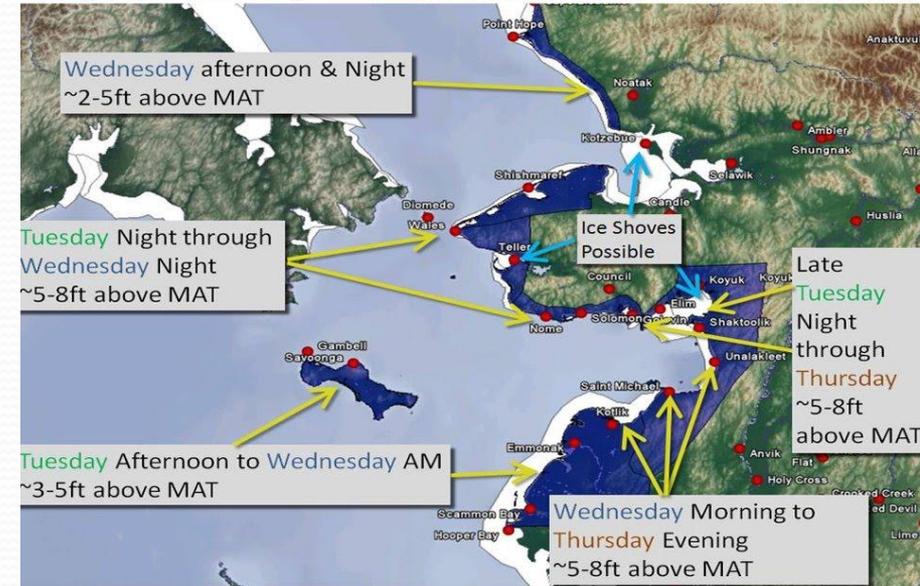
- Diminished sea ice buffer
- Increased vulnerability
- More frequent inundation
- Habitat loss

Goals

- Inventory projects; refine understanding of decisions and uncertainties; fill gaps in ice, observations, biological impacts & local involvement
- Improve ocean storm model & inundation maps
- Forecast real-time threats to communities
- Catalyze other related projects



Time of **Greatest** Coastal Flood Threat & Height of Storm Surge above the Maximum Astronomical Tide (MAT)



Adapting to Sea Level Rise Across the Pacific Coast

Partners

- CA & NP LCCs, NPS
- USGS SWCSC; CA State Parks, CA Fish & Wildlife
- SF Bay & Tijuana River NERR, Greater Farallones NMS

Issue

- Sea level rise/coastal inundation is threatening coastal ecosystems and coastal communities and reducing the valued ecosystem services they provide

Goals

- Site-specific sea level rise models for tidal marshes to help develop adaptation strategies across the Pacific Coast.
- Scenario planning that leads to better long-term restoration decisions for priority species and habitats.
- Enhance community resiliency.



Nutrient Reduction in Mississippi River Watershed

Partners

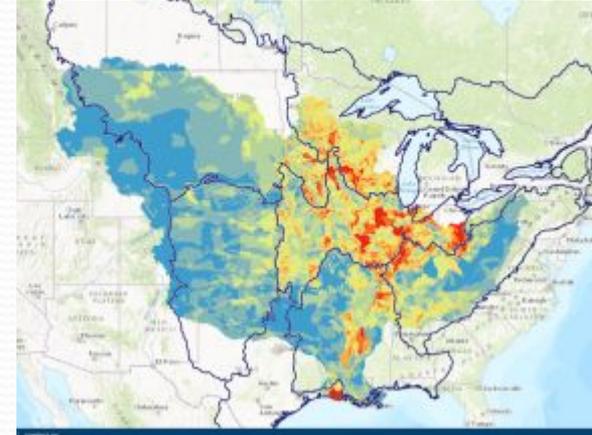
- 7 LCCs spanning the Mississippi River watershed
- Hypoxia Task Force (5 fed, 12 states, tribes)
- Gulf of Mexico Alliance (GOMA)

Issue

- Nutrient overloading in watershed
- Diminished water quality and habitats
- Hypoxia in Gulf of Mexico

Goals

- Identify key scientific uncertainties associated with design & management of a sustainable ecosystem/floodplain landscape
- Identify priority watersheds by mapping the most cost-effective and receptive places for implementing practices with multiple benefits for agricultural productivity, water quality and wildlife conservation.





Opportunities & Challenges

Growing Concern about Climate Change Impacts

- Impacts felt in more places & grabbing headlines
- Businesses, communities & resource managers want to know what is happening and what we can expect in the future
- NOAA's weather, climate and water information can help



Support for Lg.-Scale Conservation & Restoration

- Obama's Climate Action Plan & supporting strategies
- Growing awareness of LCC's in non-DOI agencies & NGOs
- Habitat restoration & natural infrastructure efforts



NOAA Place-Based Conservation & Stewardship

- NOAA: Sanctuaries, NERRs, HFAs, Sentinel Sites
- Admin: Resilient Lands & Waters & regional efforts



Funding

- Tight budgets *can* led to greater collaboration
- Federal funding opportunities (NOAA & partners)



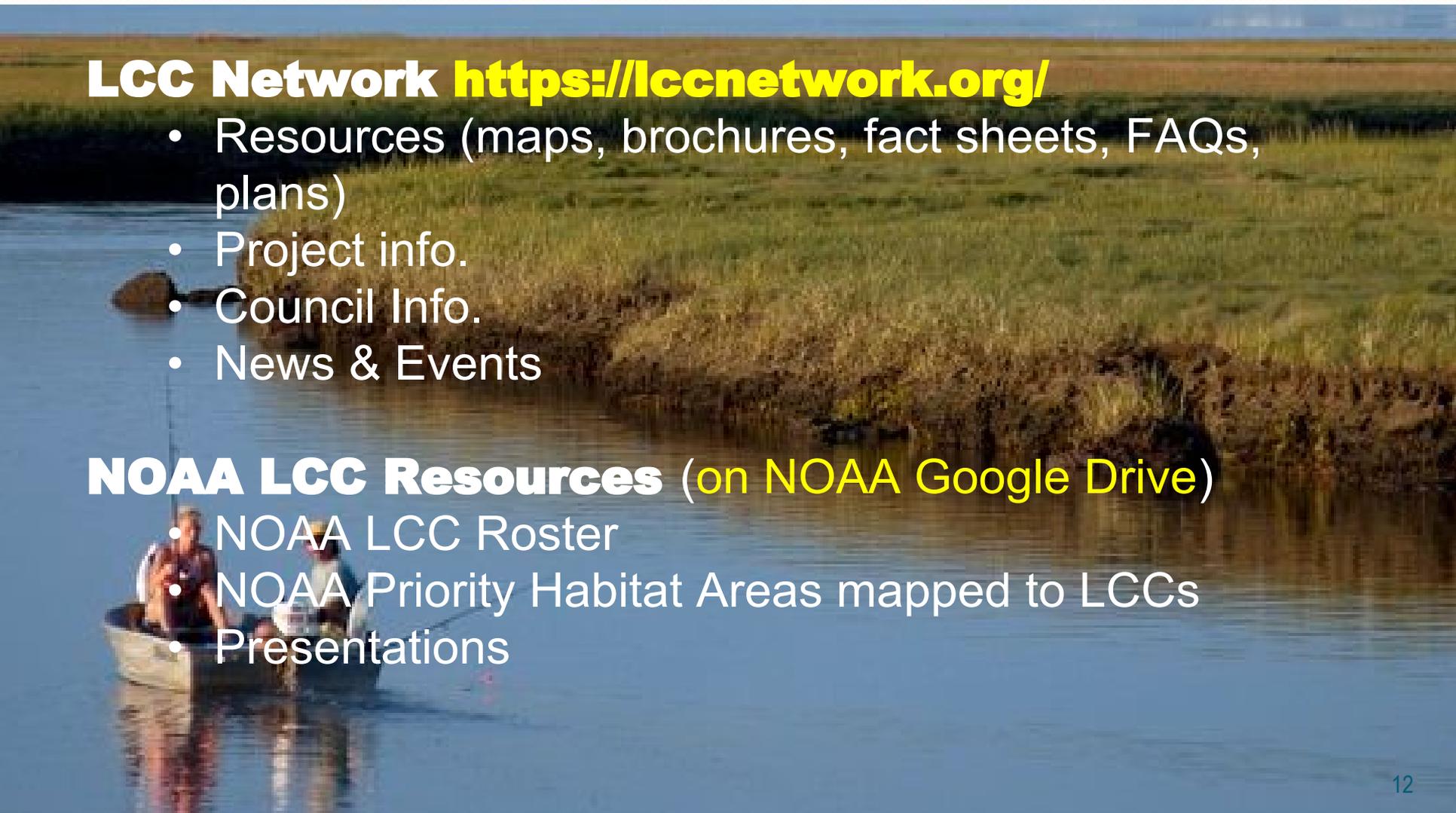
Resources

LCC Network <https://lccnetwork.org/>

- Resources (maps, brochures, fact sheets, FAQs, plans)
- Project info.
- Council Info.
- News & Events

NOAA LCC Resources (on NOAA Google Drive)

- NOAA LCC Roster
- NOAA Priority Habitat Areas mapped to LCCs
- Presentations





For More Information, Contact:

NOAA National LCC Coordinator

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BACKGROUND SLIDES

Vulnerability Assessment

Partners

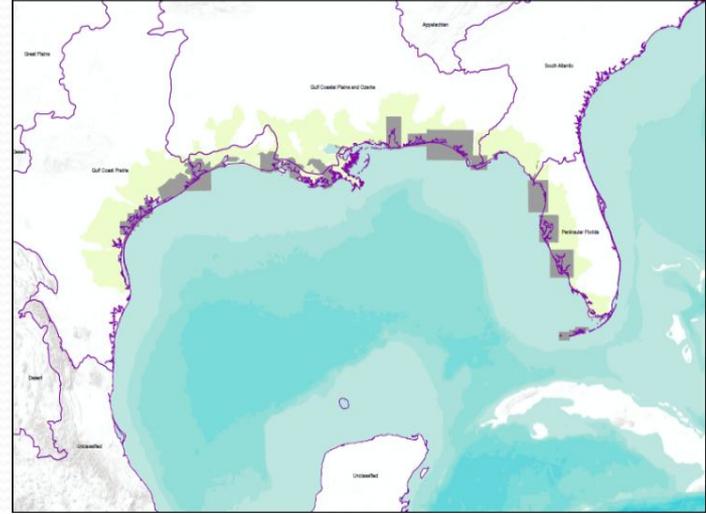
- Gulf LCCs and CSCs, GoM Alliance, States

Issue

- How to protect & restore coastal habitats in the face of sea level rise and climate change?

Goals

- Leverage competencies in observing, modeling, forecasting, information transfer, & resource mgmt..
- Targets science to solve problems of local, regional, and national scope.
- Supports state and regional partnerships
- Bring together science and partnerships to address landscape scale stressors impacting coastal ecosystems and species.





Building Upon Success in Aleutian & Bering Sea Islands LCC

Vessel Traffic Vulnerability Analysis

Partners

- ABSI LCC, Wildlife Conservation Society, Scenarios Network for Alaska & Arctic Planning (SNAP), USGC

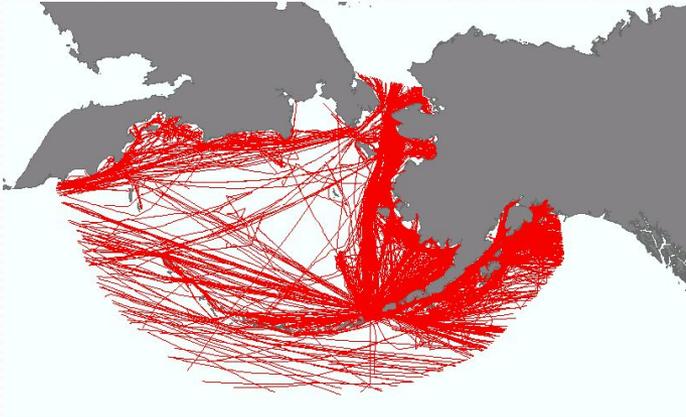


Issue

- Shipping routes transit close to sensitive wildlife sites and native communities. An oil spill could be disastrous.

Goals

- Develop a GIS data layers of vessel type and frequency transiting the region.
- Help managers & communities understand the magnitude of shipping that transits the area. The info. helped inform decision on IMO Areas to Be Avoided & future HAZMAT Responses



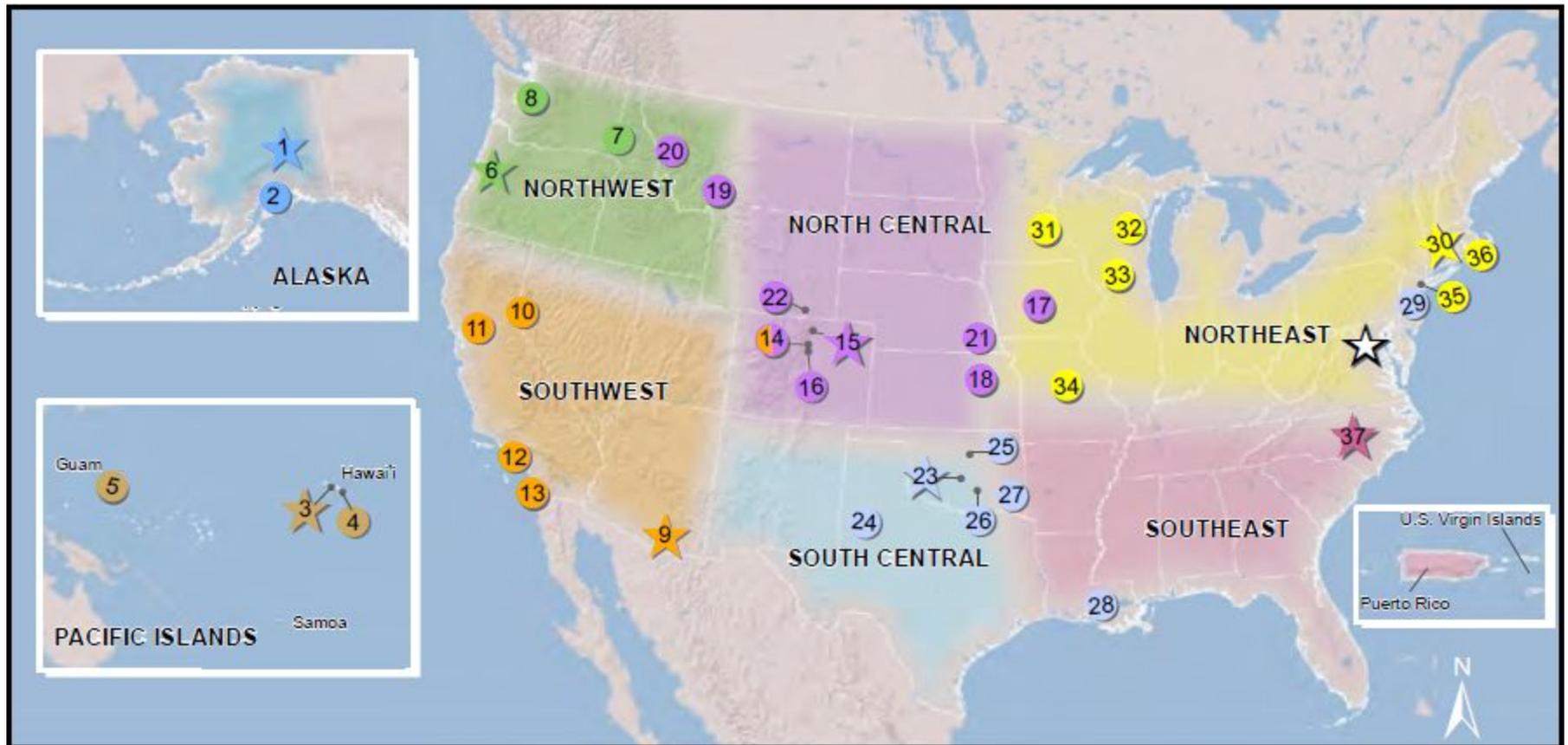
USGS National Climate Change & Wildlife Science Center and the DOI Climate Science Centers

Providing **science and tools** for **natural and cultural resource managers** to help fish, wildlife, ecosystems, & the communities they support **adapt to climate change.**

Water Resources, Drought, Sea-level Rise, Forests, Wildfire, Rivers & Streams, Glacier Change, Inland Fisheries, Migratory Birds, Mammals, Downscaled Data. Ecosystem Modeling, Climate Projections, Tribal Communities, Decision Frameworks, Connectivity, Extreme Events
And much more...



National Climate Change and Wildlife Science Center



NCCWSC & CSC Science Priorities

Science Infrastructure and Capacity Building Goals

1. Collaboration, Communication and Translation of Science Results to Managers, Stakeholders and the Public interested in Climate Change Activity.
2. Creation of a shared information and data management platform.
3. Educate and train a core of climate scientists that will provide expertise in the future.
4. Evaluate the impacts of the CSC/NCCWSC enterprise.

NCCWSC & CSC Science Priorities

Science Goals

1. Assess and synthesize our state of knowledge about climate and land use change impacts to DOI natural and cultural resources.
2. Perform vulnerability assessments of species and ecosystems.
3. Understand the social-ecological impacts of climate and land use change.
4. Understand the interactions between climate and the physical, biological, and chemical forces that influence the structure and functioning of ecosystems and the goods and services they provide.



National Climate Change and Wildlife Science Office (NCCWSC) Projects

- Projects that cross boundaries of the 8 CSCs at national and multi-regional scales:
 - [Understanding the impacts of "ecological drought"](#) on important natural resources across the country,
 - Examining the impacts of climate change on migratory waterbirds, and
 - Evaluating the use of downscaled climate information for the purpose of informing natural resource management actions



USGS Climate Science Centers

- Conduct cutting-edge research projects at local, regional and national scales; and produce products that include climate, water and ecosystem modeling, and geospatial, habitat, and species-level data.
- Are built upon federal-university partnerships, and are dependent upon engagement with a community of **stakeholders** to define research priorities and initiatives.
- Provide educational opportunities for students and early career scientists through fellowships, workshops, and trainings.
- Work with tribes and indigenous communities to better understand their specific vulnerabilities to climate change and to help them adapt to these impacts.
- The CSCs were established within DOI by Secretarial Order No. 3289. National coordination and management for the CSCs is provided by the U.S. Geological Survey's National Climate Change and Wildlife Science Center.



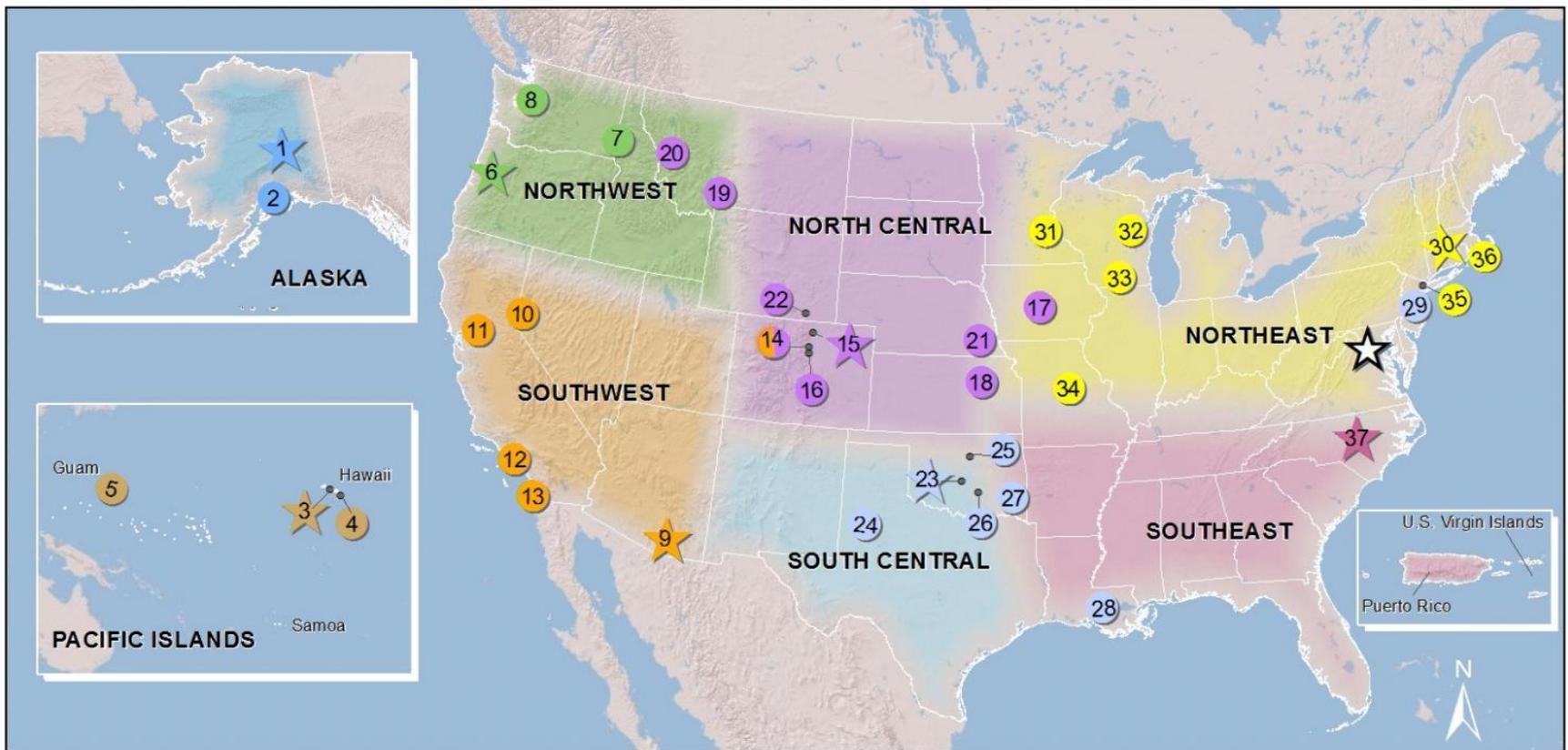


Backups



National Climate Change and Wildlife Science Center

- Assess and synthesize our state of knowledge about **climate change impacts**;
- Work collaboratively with the resource management community to develop **adaptation methodologies** that minimize the effect of climate change impacts on fish, wildlife, and habitats; and,
- Foster research that increases understanding of climate and the physical, biological, and chemical forces that influence **ecosystems and the goods and services they provide**.



Base from ESRI, 2009, Albers Equal Area Conic Projection, North American Datum of 1983

EXPLANATION

★ National Climate Change and Wildlife Science Center

1 CSC Lead Institutions

2 CSC Institutions

Alaska CSC

1. University of Alaska - Fairbanks
2. University of Alaska - Anchorage

Pacific Islands CSC

3. University of Hawaii at Manoa
4. University of Hawaii at Hilo
5. University of Guam

Northwest CSC

6. Oregon State University
7. University of Idaho
8. University of Washington

Southwest CSC

9. University of Arizona
10. Desert Research Institute (Nevada)
12. University of California - Los Angeles
13. Scripps Institute of Oceanography
14. University of Colorado

North Central CSC

14. University of Colorado
15. Colorado State University
16. Colorado School of Mines
17. Iowa State University
18. Kansas State University
19. Montana State University
20. University of Montana
21. University of Nebraska - Lincoln
22. University of Wyoming

South Central CSC

23. University of Oklahoma
24. Texas Tech University
25. Oklahoma State University
26. Chickasaw Nation
27. Choctaw Nation of Oklahoma
28. Louisiana State University
29. NOAA Geophysical Fluid Dynamics Laboratory

Northeast CSC

30. University of Massachusetts Amherst
31. University of Minnesota
32. College of Menominee Nation
33. University of Wisconsin - Madison
34. University of Missouri Columbia
35. Columbia University
36. Marine Biological Laboratory
37. North Carolina State University



Stakeholder Input

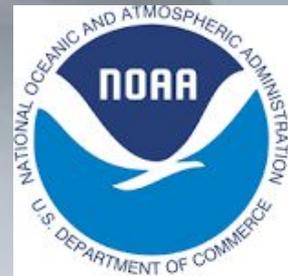
- The CSCs and NCCWSC rely on [stakeholder input](#) for the identification of research needs, the prioritization of projects, and the elevation of research products. Each CSC has a regional Stakeholder Advisory Committee that it meets with several times a year. These Committees include members from federal, state, local, regional, and tribal natural and cultural resource management entities and science providers. These regional committees, along with the Federal [Advisory Committee on Climate Change and Natural Resource Science](#), provide direct input into our annual and longer-term science planning efforts and help develop our regional science themes that comprise our funding opportunity announcements.

Briefing on U.S. Dept. of Agriculture's Climate Ag. Hubs*



*Many thanks to the USDA's Justin Derner and Jerry Hatfield for all of the slides that I have blatantly copied from

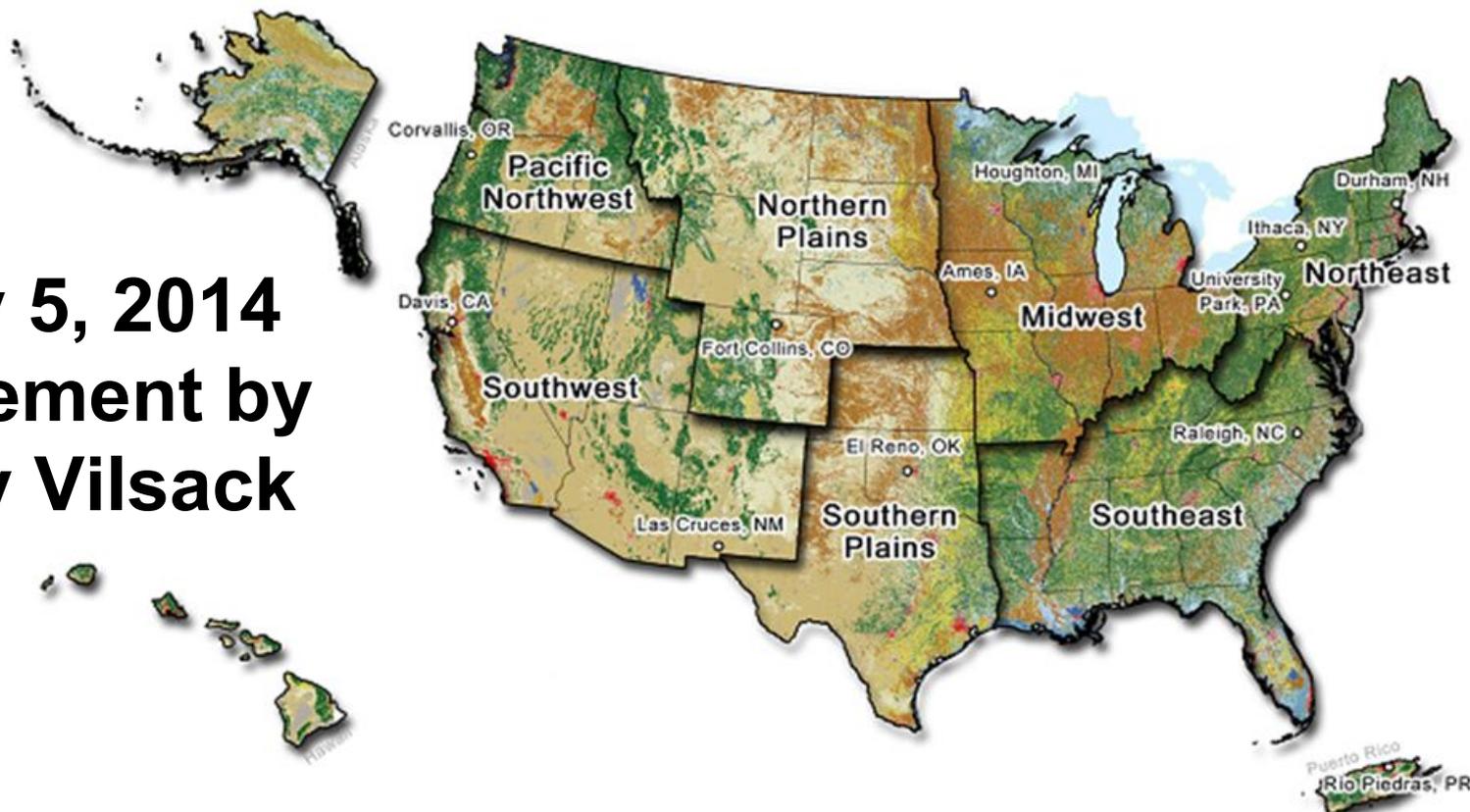
Doug Kluck, Central Region Climate Services Director
Kansas City, MO
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USDA Climate Hubs

**February 5, 2014
Announcement by
Secretary Vilsack**



Ten regional USDA Climate Hubs synthesize and deliver science-based, region-specific information and tools through existing networks of USDA agencies and partners to help land managers make climate-informed decisions.

Vulnerabilities in the Pacific Northwest

Expected changes:

- Reduced snowpack
- Increased precipitation variability
- Warmer temperatures
- Increased range of weeds and pests
- Increased wildfire risk

Vulnerabilities in the Northern Plains

Expected changes:

- Increased temperatures
- Increased competition for water and irrigation
- Changed crop growth cycles resulting from warmer winters
- Longer growing seasons
- Increase in precipitation extremes

Vulnerabilities in the Midwest

Expected changes:

- Extreme rainfall and flooding
- Increased temperatures
- Growing seasons are almost two weeks longer than in 1950, and are projected to lengthen

Vulnerabilities in the Northeast and Northern Forests

Expected changes:

- Extreme precipitation events
- Higher temperatures
- Reduced crop yields and milk production from heat stress
- Longer growing season
- Coastal flooding

Vulnerabilities in the Southern Plains

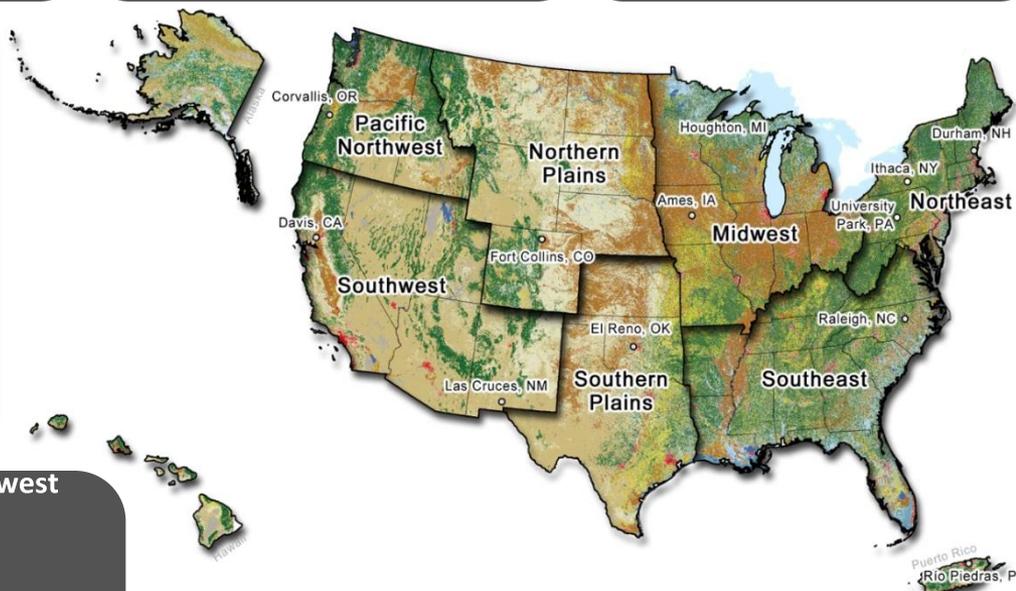
Expected changes:

- Decreased snowpack and streamflow
- Increased drought
- Increased temperature
- Possible Northward shift in crop production
- Shorter winter chill periods
- Wildfire

Vulnerabilities in the Southwest and California

Expected changes:

- Warmer temperatures
- Decreased snowpack and streamflow
- Increased drought and uncertainty in water supply
- Longer growing seasons
- Changes in plant diseases, pests, insects and weeds
- Warming could adversely affect wine, apples, and other crops
- Reduced yields from increased temperature and water scarcity for some crops
- Increased wildfire



Vulnerabilities in the Southeast and Caribbean

Expected changes:

- Sea-level rise
- Drought
- Temperature increase
- Spread of nonnative plants, weeds, and pests
- Increased insects and pathogens

Vulnerabilities in the Caribbean

Expected changes:

- Increased temperatures
- Spread of nonnative plants
- Increased insects and pathogens
- Increased sea level rise, leading to decreased fresh water availability and saltwater intrusions



Feature: USDA Climate Hub Leaders

The USDA Climate Hubs are located at an Agriculture Research Service (ARS) or Forest Service (FS) location. The ARS, FS, and Natural Resource Conservation Service (NRCS) provide leadership in each Regional Climate Hub. These leaders are working to deliver science-based information and tools to enable the agricultural and forestry sectors to implement climate-smart management practices in response to stressors due to climate variability. Photo credit: Sarah S. Wiener.



United States Department of Agriculture
CLIMATE HUBS

Find more at: www.usda.gov/climatehubs



Key Objective

- The Hubs will deliver science-based knowledge and practical information to **farmers, ranchers, and forest landowners** that will help them to adapt to weather and climatic variability by ***coordinating*** with local and regional partners in Federal and state agencies, NGO's, private companies, and Tribes.





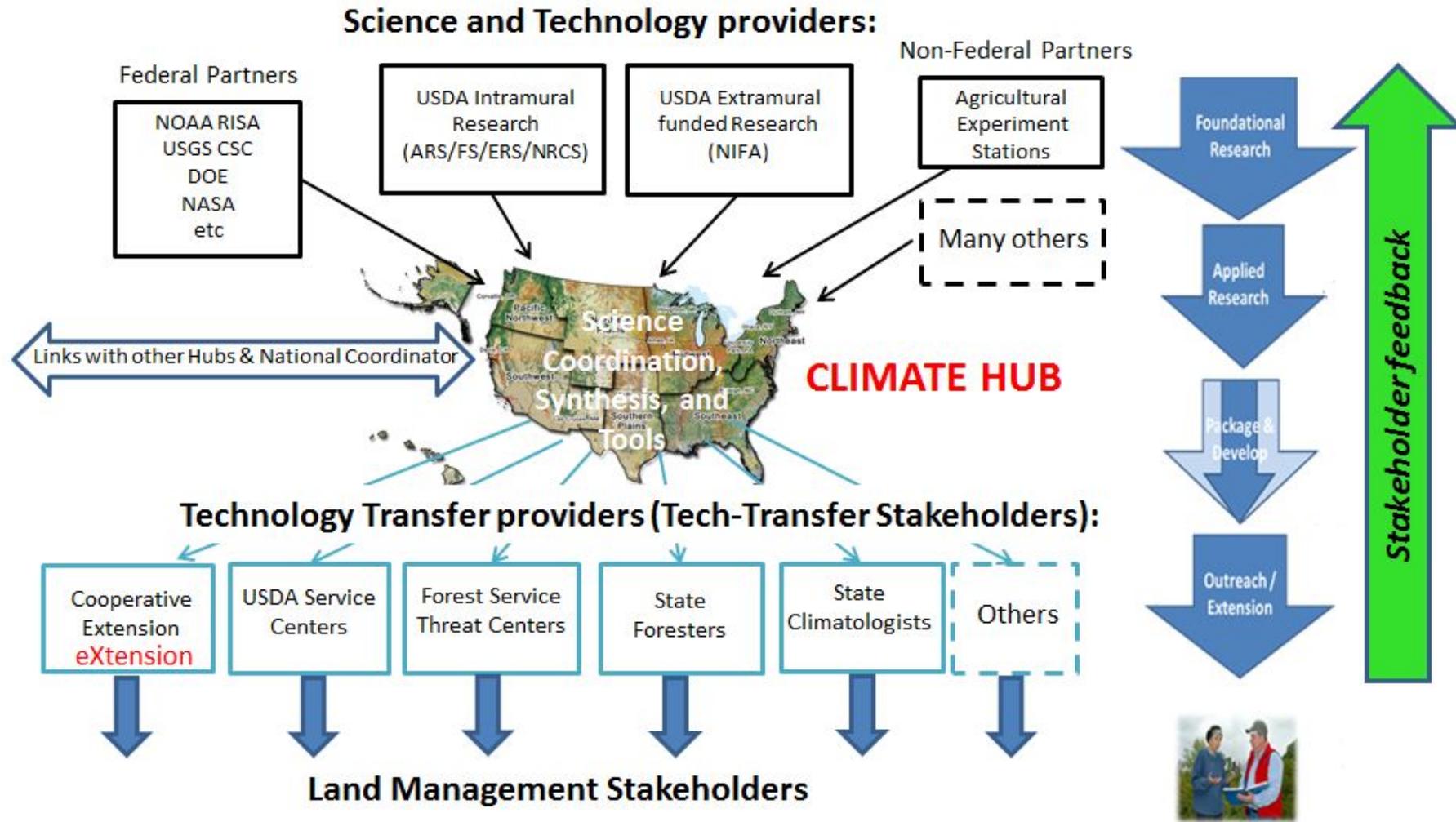
Key Approach

- Conduct the transfer of information, tools and management practices *through trusted technology transfer providers* to **agricultural producers** to enhance **decision making** with regard to the **direct and indirect impacts of weather variability** for reduction of enterprise risk and increased resilience of working lands.





Conceptual Framework for a USDA Regional Hub



Farmers / Ranchers / Forest Managers / Tribes / States / Feds / LCCs / Others





USDA Regional Climate Hub Personnel

- **Director: Ag Research Service or Forest Service (hiring new directors now)**
- **Program Coordinator**
- **Intra-agency Liaisons: Farm Service Agency (FSA), Natural Resources Conservation Service (NRCS), Risk Management Agency (RMA) and Animal and Plant Health Inspection Service (APHIS)**



Ongoing USDA Regional Climate Hub Efforts

- **Regional Vulnerability Assessments**
- **USDA Building Block Workshops**
- **Collaborations with NIFA-CAP grants**
- **Collaborations with other federal efforts**
- **Collaborations with Extension**
- **Collaborations with State Climatologists, Regional Climate Centers and NOAA**
- **Development of educational (K-12) curricula**
- **Adaptation demonstration videos**
- **Fact sheets**
- **Special issue of *Climatic Change* (coming)**



Adaptation Management Strategies



- **Improve soil health**
- **Alter planting dates**
- **Change crop varieties/cultivars**
- **Utilize cover crops**
- **Double cropping**
- **More “crop per drop: emphasis for water use**
- **Improve crop rotations**
- **Integrate crop-livestock systems**
- **Use of crop residues**
- **Increase residue cover to reduce soil exposure**
- **Adaptive and flexible stocking**
- **Livestock enterprise changes to include both cow-calf and yearling**
- **Grassbanking**

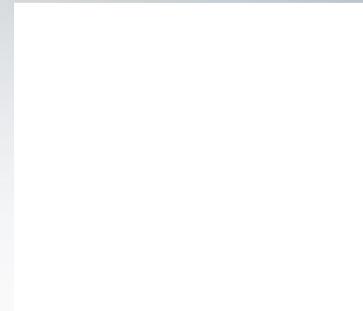
Reproductive strategies to reduce soil erosion and improve soil health



Outreach/Education



Conduct retrospective/prospective efforts to garner feedback from agricultural producers.



Climate & Ag Tools Workshops

(March 2016)

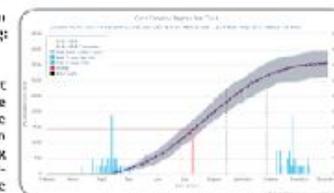


Next Steps

The workshop participants identified both long-term and short-term areas of future collaboration, including:

Decision Support Tools for Agriculture

In the spring of 2017, the U2U suite of Decision Support Tools (DST) will be transitioning to new homes within the Regional Climate Center (RCC) Program. Currently, these tools are available for select crops for states within the Corn Belt region. Participants expressed an interest in expanding the reach of these tools westward to include Colorado, Wyoming, and Montana. An enhancement of these tools to be applied to other crops such as wheat and alfalfa, in addition to the development of tools for rangeland, is also desired.



Example of available tool for wheat stress



The cow's climate interface. (Photo courtesy Glen Faelke)

Climate Data Training and Education

The High Plains Regional Climate Center (HPRCC) has conducted regional climate services workshops for various groups, such as the National Weather Service and the Tribes of the Wind River Indian Reservation. These sessions included introductions to the key partners in the Missouri River Basin region, as well as hands-on experience with climate data and information tools. Similar training sessions could be developed and tailored explicitly for extension or the USDA. Given the resources at the University of Nebraska-Lincoln, partners for the training could include the HPRCC, the National Drought Mitigation Center (NDMC), and the Nebraska State Climate Office (NSCO).

Enhanced Climate and Drought Early Warning for Wyoming Agriculture

A need has emerged for routine drought early warning bulletins for the state of Wyoming. Opportunities exist for collaboration between many workshop participants including NOAA, USDA, National Weather Service (NWS), HPRCC, Wyoming Office of the State Engineer Tribes of the Wind River Indian Reservation, the Western Water Assessment, USDA, and university extension.

Looking for Existing Tools?

A suite of tools is already available to aid producers in their decisions and also in the early warning of climatic events, such as droughts and floods. See list below for more information.

- U2U Decision Support Tools
<https://mygothub.org/groups/u2u/tools>
- Midwest and Great Plains Monthly Climate and Drought Webinars
<http://www.hprcc.unl.edu/webinars.php>
- Missouri River Basin Quarterly Climate Impacts and Outlook
<https://www.drought.gov/drought/dews/missouri-river-basin/reports-assessments-and-outlooks>



Doug Kluck presenting on drought examples in the region (Photo courtesy Natalie Umphlett)

For more information, please contact:

Doug Kluck, Regional Climate Services Director, NOAA (Doug.Kluck@noaa.gov)
Justin Derner, Director, USDA Northern Plains Regional Climate Hub (Justin.Derner@ars.usda.gov)
Natalie Umphlett, Interim Director, High Plains Regional Climate Center (numphlett@unl.edu)

Useful to Usable: Transforming Climate Variability and Change Information for Cereal Crop Producers



AgClimate4U.org

AVAILABLE NOW

AgClimate View_{DST}

This tool provides easy-to-use historical climate and crop yield data for the Corn Belt.



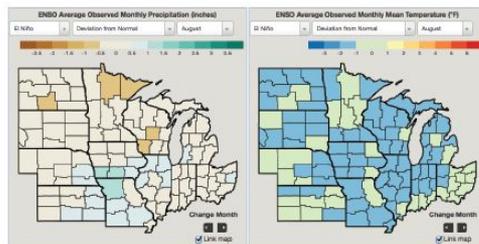
Corn GDD_{DST}

Track real-time GDD accumulations and learn about climate risks for corn development.



Climate Patterns Viewer_{DST}

Connect global climate conditions to local climate impacts.



United States Department of Agriculture
National Institute of Food and Agriculture

Midwest Climate and Agriculture Workshop (Oct 2015)

- Midwestern Specialty Crop and Livestock Focus
 - Cherries, grapes, pumpkins, etc..
 - Dairy, feeder cattle, poultry, pigs, etc..
- Climate Impacts
- Needs and Gap Assessment





**Thank You
Questions?**



Backup



Building Block Agency Leads

Building Block	Agency Lead
Soil Health	<u>NRCS</u> , RMA, FSA, ERS, ARS, NIFA, NASS
Nitrogen Stewardship	<u>NRCS</u> , RMA, FSA, ERS, ARS, NIFA
**Livestock Partnerships	<u>RD</u> , NRCS
Conservation of Sensitive Lands	<u>FSA</u> , NRCS, ERS, ARS, NIFA
**Grazing and Pasture Lands	<u>NRCS</u> , FS, RMA, FSA, ERS, ARS, NIFA
**Private Forest Growth and Retention	FS
Stewardship of Federal Forests	FS
Promotion of Wood Products	FS
Urban Forests	FS
Energy Generation and Efficiency	RD, NRCS, RUS

Livestock – key questions

- Prediction of dew point temps at night, In terms of cooling animals, it's not how high during the day but how much it cools off at night, as well as the high dew points
- When the animals can't cool off at night, that's problematic
- The only technique currently to effectively cool animal housing is by sprinkling – which is useless when the dew points are already high (they don't have air conditioning)
- Heat stress is the most important for livestock
 - For dairy, there is heat stress above 65F
 - It is difficult to cool big birds with large feathers
- Other issues
 - When livestock producers lose electrical power, they have minutes to do something or you have dead animals
 - Transport of animals during summer requires special attention to temperature and humidity conditions to ensure safe transport.

Specialty Crops – key questions

- How cold does it get in the wintertime?
- Was it warm before the cold spell occurred?
- In the springtime when fruit crops start to grow, when gardeners are planting, farmers start to plant corn – like to know a month beforehand if the temperature was going to get below 20F or 25F and for how long
- Fall:
 - When harvesting freeze tender crops – what is the chance for a freeze in the next week?
 - If growing hops and it freezes, the harvest is over in 24 hours

Adaptation and Mitigation

- Linked together to protect and enhance the natural resources of soil, water, and air
- Climate Hubs integrate information to deliver solutions to producers through a variety of outlets